

## REVIEW OF THE GENUS *Naultinus* Gray (REPTILIA: GEKKONIDAE)

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*Abstract.* Evidence for the recognition of *Naultinus grayi* Bell and *N. elegans* Gray is given, and two subspecies *N. elegans elegans* and *N. elegans punctatus* Gray (stat. nov.) are distinguished. These findings are based on differences in the reproductive cycle, and morphological features such as size, colour of skin and tongue, and scalation. The geographical distribution of the taxa is described, and a revised synonymy given.

*Naultinus* is one of three genera of geckos endemic to New Zealand. It is widely distributed throughout the North Island, to which it is largely confined, although occasionally specimens have been found on some of the larger off-shore islands in the Hauraki Gulf (e.g. Great and Little Barrier Islands, and the Mokohinau Islands).

The genus *Naultinus* was erected in 1842 by J.E. Gray, of the British Museum (Gray 1842) to accommodate specimens of two types of gecko collected by Dr Ernst Dieffenbach and later presented to the Museum by Sir Richard Owen. One of these forms was brown, and the other green; the former Gray named *N. pacificus* and the latter *N. elegans*. Boulenger (1885) later transferred *N. pacificus* to the genus *Hoplodactylus*, while *N. elegans* has so far survived as described by Gray, despite several attempts to rename it.

Since the erection of the genus in 1842 a number of changes and additions have been proposed, the majority of these proposals resulting from the wide variety of colour patterns which occur among these basically green geckos. In 1843 Bell added the species *grayi* to the genus (Bell 1843), and in the same year Gray (1843) described *N. punctatus*. Although both species were synonymised with *N. elegans* by Boulenger (1885), and all subsequent writers followed his lead, we are of the opinion that the former is a good species and the latter should be regarded as a subspecies of *N. elegans*. In 1851 Dumeril (1851) placed *N. elegans* in the genus *Gymnodactylus*, but this move was not accepted by other zoologists.

Buller (1871) added the species *N. sulphurus* to accommodate the yellow forms; doubt was cast on the validity of this species by Lucas & Frost (1897), while McCann (1955) accepted the name *sulphurus*, with some reserve, to denote what he assumed to be the only colour form to produce young like itself. However, it has been observed by us that even the yellow forms do not breed true to colour.

In 1880 Colenso (1880) described *N. pentagonalis*, from Hawkes Bay, noting differences between this larger, southern North Island form, and the more delicately built specimens common to the Auckland region. Later writers (notably Lucas & Frost 1897, and McCann 1955) did not accept this distinction, and Colenso (1880) did not recognise that his *pentagonalis* was in fact the same taxon as Gray's *punctatus*.

In 1961 Chrapliwy, Smith & Grant (1961) raised the question of priority regarding the generic names *Hoplodactylus* and *Naultinus*, pointing out that while Gray had described both *N. elegans* and *N. pacificus* in the same publication, the latter had page priority over the former. They therefore proposed that the generic name *Hoplodactylus* Fitzinger, 1843 should be replaced by *Naultinus* Gray, 1842; and they further suggested that the generic name *Naultinulus* be adopted to replace the former usage of *Naultinus*. These proposals were rejected, following argument by Myers (1961) against their adoption. Wermuth (1965) supported Myers' contention that the two generic names should not be changed, as indeed do we.

Species originally placed in the genus *Naultinus* and later discarded as synonyms of species in other genera include *Naultinus greyii* Knox, 1869, now *Hoplodactylus granulatus*, (Knox 1869); *Naultinus lineatus* Gray, 1869, now *Heteropholis gemmeus* (?), (Gray 1869); *Naultinus elegans stellatus* Hutton, 1872, now *Heteropholis stellatus*, (Hutton 1872); *Naultinus pulcherrimus* Buller, 1876, now *Heteropholis stellatus*, (Buller 1876); *Naultinus sylvestris* Buller, 1880, now *Hoplodactylus granulatus*, (Buller 1880); *Naultinus versicolor* Colenso, 1884, now *Hoplodactylus granulatus*, (Colenso 1884).

#### Genus *Naultinus* Gray, 1842

- 1842 *Naultinus* (part) Gray, *Zool. Misc.* pp. 58 & 72.  
 1843 *Naultinus* (part) Gray, In: Dieffenbach, *N. Zeal.* 2, p. 202.  
 1843 *Naultinus*: Bell, *Voy. of the Beagle*, Rept. p. 27.  
 1845 *Naultinus* (part) Gray, *Cat. Liz.* p. 169.  
 1851 *Gymnodactylus* (part) A. Duméril, *Cat. Meth.*, Rept. p. 42.  
 1857 *Naultinus*: Girard, *U.S. Exploring Exped.* Herp., p. 309, p. xvi, figs 17-26.  
 1861 *Hoplodactylus* Fitzinger, *Sber. Akad. Wiss. Wien* 42: 383.  
 1867 *Naultinus* (part): Steindachner, *Novara Rept.* p. 19-20 (note spelling).  
 1871 *Naultinus* (part): Buller, *Trans. Proc. N.Z. Inst.* 3: 6.  
 1875 *Naultinus* (part): Gunther, *Voyage of Erebus and Terror* Rept. p. 17.  
 1875 *Naultinus* (part): Hutton, *Trans. Proc. N.Z. Inst.* 4: 171.  
 1897 *Naultinus* (part): Lucas and Frost, *Trans. Proc. N.Z. Inst.* 29: 267.  
 1933 *Naultinus*: Smith, *Rec. Ind. Mus.* 31: 13.  
 1955 *Naultinus*: McCann, *Dom. Mus. Bull.* 17: 28.  
 1961 *Naultinulus* Chrapliwy, Smith and Grant, *Herpetologica* 17: 7.  
 1965 *Naultinus*: Wermuth, *Das Tierreich* 80: 110.

*Diagnosis.* Digits free, feebly dilated, narrowing distally, clawed, and with a series of transverse lamellae on the ventral surface. Anterior head scales enlarged. Dorsal scales uniformly granular, or tubercular. Pupil vertical. Males with preanal and femoral pores, and 2-4 large spines on each side of the base of the tail; females with or without abortive preanal and femoral pores, and vestiges of spines at base of tail.

#### *Naultinus elegans* Gray, 1842

(Figs. 1, 2, 5, 7)

- 1842 *Naultinus elegans* Gray, *Zool. Misc.* 4: 72.  
 1843 *Naultinus elegans* Gray, In: Dieffenbach, *N. Zeal.* 2, p. 203.  
 1843 *Naultinus punctatus* Gray, *loc. cit.* p. 204.  
 1845 *Naultinus elegans* Gray, *Cat. Liz.* p. 169.  
 1845 *Naultinus punctatus* Gray, *loc. cit.* p. 170.  
 1851 *Gymnodactylus elegans* A. Duméril, *Cat. Meth.*, Rept. p. 43.  
 1857 *Naultinus punctatus*: Girard, *U.S. Exploring Exped.* Herp., p. 309, p. xvi, figs 17-26.  
 1861 *Hoplodactylus elegans*: Fitzinger, *Sber. Akad. Wiss. Wien.* 42: 400.

- 1867 *Nautlinus elegans* (part): Steindachner, *Novara Rept.* p. 19.  
 1867 *Nautlinus punctatus*: Steindachner, *loc. cit.* p. 20.  
 1871 *Nautlinus elegans*: Buller, *Trans. Proc. N.Z. Inst.* 3: 7, pl. 2, fig. 1.  
 1871 *Nautlinus punctatus*: Buller, *loc. cit.* p. 8.  
 1871 *Nautlinus sulphurus* Buller, *loc. cit.* p. 8.  
 1872 *Nautlinus elegans*: Hutton, *Trans. Proc. N.Z. Inst.* 4: 170.  
 1872 *Nautlinus punctatus* (part): Hutton, *Trans. Proc. N.Z. Inst.* 4: 171.  
 1872 *Nautlinus sulphurus*: Hutton, *Trans. Proc. N.Z. Inst.* 4: 172.  
 1875 *Nautlinus elegans*: Gunther, *Voyage of Erebus and Terror Rept.* p. 17.  
 1875 *Nautlinus punctatus*: Gunther, *loc. cit.* p. 17.  
 1880 *Nautlinus pentagonalis* Colenso, *Trans. Proc. N.Z. Inst.* 12: 262.  
 1885 *Nautlinus elegans* (part): Boulenger, *Cat. Liz.* 1: 168.  
 1897 *Nautlinus elegans* (part): Lucas and Frost, *Trans. Proc. N.Z. Inst.* 29: 267.  
 1933 *Nautlinus elegans*: Smith, *Rec. Ind. Mus.* 31: 13.  
 1955 *Nautlinus elegans* (part): McCann, *Dom. Mus. Bull.* 19: 28.  
 1961 *Nautlinulus elegans* (part) Chrapliwy, Smith and Grant, *Herpetologica* 17: 7.  
 1965 *Nautlinus elegans* (part): Wermuth, *Das Tierreich* 80: 110.

*Diagnosis.* Medium to large-sized *Nautlinus*; (snout-vent length 65-95 mm) dorsal surface of snout, to level of eyes, covered with large dome-shaped scales, more posteriorly head scales smaller and granular; rostral (of adult) two and a half times or less as broad as depth at centre, often with median cleft from upper edge; mental usually roughly square or oblong, bordered posteriorly by 3 or more small post-mental scales. The species is diurnal.

*Description.* Head oviform, small to large; snout bluntly rounded, forehead flat; ear-opening small, oval, horizontal; body and limbs moderate to robust; digits free, clawed, somewhat dilated, narrowing distally, 10-18 straight-edged lamellae under 4th toe; dorsal surface of snout (Fig. 5) to level of eyes, covered with large dome-shaped scales, rest of head covered with smaller granular scales; rostral (Fig. 1) (of adult) usually less than two and a half times as broad as depth at centre, often with median cleft extending downward from upper border; nostril pierced between first upper labial and 3-5 (usually 4) nasals, the anterior-most of which is enlarged; 1 large internasal; 9-14 upper labials, and 9-13 lower labials; mental (Fig. 2) roughly square or oblong, posterior margin shorter than anterior and usually bordered by 3-4 small post-mental scales; dorsal body scales small, granular, abdominal scales small, subimbricate; males with large patch (4-8 series) of preanal pores, and 2-3 rows of femoral pores; in females preanal and femoral pores absent or few, and vestigial; tail elongate, prehensile, tapering finely, covered with small to moderate sized scales; in males the base of the tail swollen to accommodate the hemipenes and with 2-4 enlarged, pointed conical scales on each side of the swollen base; females with vestiges of these scales.

*Colour.* Dorsal surface dark or vivid green, with or without pale green, yellow or white markings in the form of lines, spots or blotches, which may or may not be outlined in dark green, brown or black. Lower lip frequently edged with white; mouth and tongue dark blue. Ventral surface paler than dorsal surface, blue in some males; blue stripe along flanks of some males. Under-surface of feet and toes grey/green or bright yellow.

*RANGE.* North Island, New Zealand, south of Whangarei and Dargaville (Fig. 7).

*Type.* Adult female in the collection of the British Museum (Natural History) (BMNH 1946.8.22.36.).

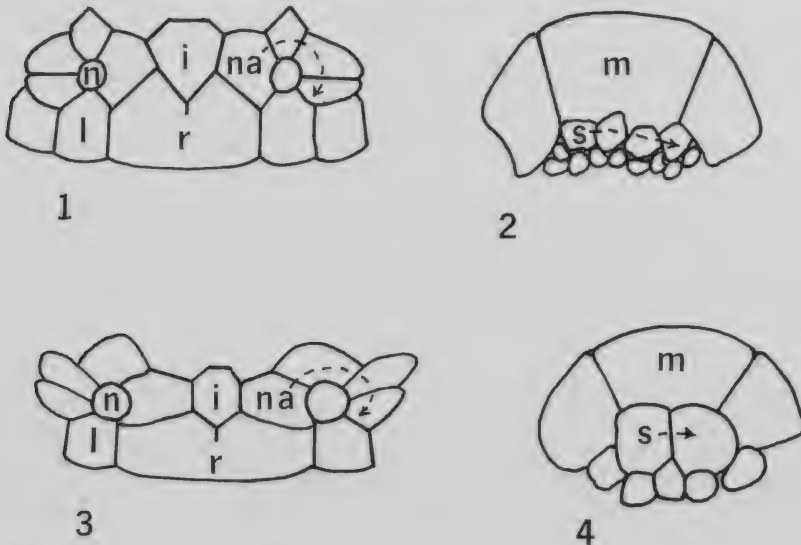
***Naultinus elegans elegans* Gray, 1842**

(Figs. 1, 2, 5, 7)

*Diagnosis.* Medium-sized *Naultinus*; (snout-vent length 65-75 mm) dorsal surface of snout to level of eyes covered with large dome-shaped scales, more posteriorly head scales smaller and granular; rostral (of adult) usually less than two and a half times as broad as depth at centre; mental usually roughly square or oblong, bordered posteriorly by 3 or more small postmental scales. Vivid green dorsally, paler beneath; undersurface of feet and toes grey/green. The subspecies is diurnal.

*Description.* Head oviform, moderate, snout bluntly rounded, forehead flat, ear opening small, oval, horizontal; body and limbs moderate; digits free, clawed, somewhat dilated, narrowing distally, 10-16 (usually 10-13) straight-edged lamellae under 4th toe; dorsal surface of snout, to level of eyes, covered with large dome-shaped scales, rest of head covered with smaller granular scales; rostral (of adult) usually less than two and a half times as broad as depth at centre, often with median cleft extending downward from upper border; nostril pierced between first upper labial and 3-5 (usually 4) nasals, the anterior-most of which is enlarged; 1 large internasal; 9-14 (usually 10-12) upper labials, and 9-13 (usually 10-11) lower labials; mental roughly square or oblong, posterior margin shorter than anterior and usually bordered by 3-4 small postmental scales; dorsal body scales small, granular; abdominal scales small, subimbricate; males with large triangular patch (up to 8 series) of preanal pores, and 2-3 long rows of femoral pores; in females, a triangular patch of enlarged preanal scales, with or without a few vestigial pores; vestigial femoral pores absent or very few; tail elongate, prehensile, tapering finely, covered with moderate-sized scales; in males the base of the tail swollen to accommodate the hemipenes, and with 3-4 enlarged, pointed, conical scales (often with up to 4 similar but smaller scales immediately behind) on each side of the swollen base; females with vestiges of these scales.

*Colour.* Normally vivid green dorsally, either without markings, or with a varying amount of white, yellow, or pale pink in the form of stripes, spots or blotches, any of which may be outlined with a fine dark green, brown or black line, and extend on to the tail. Ventral surface of females a much paler shade of the dorsal coloration, males normally with blue



Figs. 1-4. *Naultinus* spp. 1, 2. *Naultinus elegans elegans*. 1. Anterior head shields. 2. Anterior shields of lower jaw. 3, 4. *Naultinus grayi*. 3. Anterior head shields. 4. Anterior shields of lower jaw.

i, internasal; l, first upper labial; m, mental; n, nostril; na, nasal; r, rostral; s, submental.

undersurface. Lower lip frequently outlined in white, mouth and tongue dark blue. Undersurface of feet and toes pale grey/green. Yellow individuals sometimes occur, which may be plain coloured, or have spots or stripes of white or pink, with or without brown or black outline; in yellow males the ventral surface is white, or almost so.

It may be noted that green specimens frequently turn pink in preservative.

RANGE. This subspecies is found from Dargaville and Whangarei in the north of the North Island, through the Auckland and Waikato districts, northern Bay of Plenty and northern Taranaki, and also on some islands in the Hauraki Gulf (Fig. 7).



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Figs. 5, 6. Snout. 5. *Naultinus elegans elegans*. 6. *Naultinus grayi*.

TYPE LOCALITY. Auckland.

Type. Adult female in the collection of the British Museum (Natural History). (BMNH 1946.8.22.36.).

Material examined. *Naultinus elegans elegans*. Holotype: B.M. (N.H.) 1946.8.22.36. Ecology Division, D.S.I.R., collection: G304, 435, 471, 772, 893, 894, 899, 1077, 1078, 1090, 1107, 1121, 1122. Auckland Institute and Museum collection: Rep. 27.1-27.23, 27.26-27, 27.42. Zoology Department, University of Auckland, collection: R39, 47, 68, 78, 80-83, 87, 100-104. National Museum collection: R82. Live specimens: 7 in private collection (R.A.H.), Turangi area (1), Albany (1), Glenfield (1), Massey (West Auckland) (2), Bethell's Beach (2); 17 in collection of Mr R.C. Sutton, Turangi; 17 in field, Gill's Road, Albany.

***Naultinus elegans punctatus* Gray, 1843 (stat. nov.)**

(Fig. 7)

1843 *Naultinus punctatus* Gray, In: Dieffenbach, *N. Zeal.* 2, p.204.

1845 *Naultinus punctatus* Gray, *Cat. Liz.* p. 170.

1857 *Naultinus punctatus*: Girard, *U.S. Exploring Exped.* Herp. p. 309.

1861 *Hoplodactylus punctatus*: Fitzinger, *Sber. Akad. Wiss. Wein.* 42: 400.

1867 *Naultinus punctatus*: Steindachner, *Novara Rept.* p. 20 (note spelling).

1871 *Naultinus punctatus*: Buller, *Trans. Proc. N.Z. Inst.* 3: 8.

1872 *Naultinus punctatus* (part): Hutton, *Trans. Proc. N.Z. Inst.* 4: 171.

- 1875 *Naultinus punctatus*: Gunther, *Voyage of Erebus and Terror*. Rept. p. 17.  
 1880 *Naultinus pentagonalis* Colenso, *Trans. Proc. N.Z. Inst.* 12: 262.  
 1885 *Naultinus elegans* (part): Boulenger, *Cat. Liz.* 1: 168.  
 1897 *Naultinus elegans* (part): Lucas and Frost, *Trans. Proc. N.Z. Inst.* 29: 267.  
 1955 *Naultinus elegans* (part): McCann, *Dom. Mus. Bull.* 17: 28.  
 1961 *Naultinulus elegans* (part): Chrapliwy, Smith and Grant, *Herpetologica* 17: 7.  
 1965 *Naultinus elegans* (part): Wermuth, *Das Tierreich* 80: 110.

*Diagnosis.* Large-sized *Naultinus* (snout-vent length up to 95 mm); dorsal surface of snout to level of eyes covered with large dome-shaped scales, more posteriorly head scales smaller and granular; rostral (of adult) usually less than two and a half times as broad as depth at centre; mental usually roughly oblong, bordered posteriorly by 3 or more small postmental scales. Dark green dorsally, paler beneath, males with blue band along flank. Dorsal edge of toes bright yellow. Enlarged scales on base of tail in males yellow/brown.

*Description.* Head oviform, large, snout bluntly rounded, forehead flat, ear opening small, oval, horizontal; body and limbs robust; digits free, clawed, somewhat dilated, narrowing distally, 11-18 (usually 13-14) straight-edged lamellae under 4th toe; dorsal surface of snout to level of eyes, covered with large dome-shaped scales, rest of head covered with smaller granular scales; rostral (of adult) usually less than two and a half times as broad as depth at centre, often with median cleft extending downward from upper border; nostril pierced between first upper labial and 3-5 (usually 4) nasals, the anterior most of which is enlarged; 1 large internasal; 10-13 (usually 11-12) upper labials, and 9-13 (usually 11-12) lower labials; mental roughly oblong, posterior margin shorter than anterior, and usually bordered by 3-4 small postmental scales; dorsal body scales small, granular; abdominal scales small, subimbricate; males with large rounded patch of preanal pores, and 2-3 medium length rows of femoral pores; in females vestigial preanal pores few or absent, femoral pores absent; tail elongate prehensile tapering finely, covered with moderate-sized scales; in males the base of the tail swollen to accommodate the hemipenes, and with 2-3 enlarged pointed conical yellow/brown scales on each side of the swollen base; females with vestiges of these scales.

*Colour.* Less variable in colour than *N. e. elegans*; generally dark bluish-green dorsally, with or without paler leaden-grey spots or lines, which when present are not darkly outlined. Ventral surface of females pale green, often with yellowish tone; that of males bright pale green. Dorsal and ventral coloration of males separated by a blue stripe along the flank, between insertion of fore and hind limbs. Lower lip frequently edged in white; mouth and tongue dark blue. Undersurface of feet and toes bright yellow. Dorsal surface of toes fringed in yellow. Yellow individuals known, but much less common than in *N. e. elegans*.

Although the colour description is based on preserved material it is consistent with colours of live specimens as previously observed by both of us.

*RANGE.* This subspecies is found in the south-eastern region of the North Island, from East Cape to southern Hawkes Bay east of the main dividing ranges and across the southern part of the island (Fig. 7).

*TYPE LOCALITY.* New Zealand.

*Type.* Adult male in the collection of the British Museum (Natural History) (BMNH 1946.8.22.38).

*Material examined.* *Naultinus elegans punctatus*. Holotype: BM(N.H.) 1946.8.22.38. Ecology Division, D.S.I.R. collection: G19, 21, 23, 25, 35, 36, 304-7, 334, 418, 526, 531, 863, 867-9, 1050, 1074, 1076, 1104, 1105, 1108. Zoology Department, University of Auckland, collection: R108-114. National Museum collection: R70, 75-79, 80-84, 87, 344, 413, 437, 460, 508-09, 799, 828, 837, 888, 915-18, 976-80, 1581.

**Naultinus grayi** Bell, 1843

(Figs. 3, 4, 6, 7)

- 1843 *Naultinus grayi* Bell, *Zool. Voyage "Beagle"* 5, Rept. p. 27; pl. 16, fig. 2.  
 1845 *Naultinus grayi*: Gray, *Cat. Liz.*, p. 170.  
 1861 *Hoplodactylus grayi*: Fitzinger, *Sber. Akad. Wiss. Wien.* 42: 400.  
 1871 *Naultinus grayi*: Buller, *Trans. Proc. N.Z. Inst.* 3: 7.  
 1872 *Naultinus punctatus* (part): Hutton, *Trans. Proc. N.Z. Inst.* 4: 171.  
 1875 *Naultinus grayi*: Gunther, *Voyage of Erebe and Terror* Rept. p. 17.  
 1885 *Naultinus elegans* (part): Boulenger, *Cat. Liz.* 1: 168.  
 1897 *Naultinus elegans* (part): Lucas and Frost, *Trans. Proc. N.Z. Inst.* 29: 267.  
 1955 *Naultinus elegans* (part): McCann, *Dom. Mus. Bull.* 17: 28.  
 1961 *Naultinus elegans* (part): Chrapliwy, Smith and Grant, *Herpetologica* 17: 7.  
 1965 *Naultinus elegans* (part): Wermuth, *Das Tierreich* 80: 110.

*Diagnosis.* Large-sized *Naultinus* (snout-vent length up to 95 mm); dorsal surface of snout, to level of eyes, covered with very large, flat, polygonal scales, more posteriorly head scales smaller and granular; rostral (of adult) usually more than two and a half times as broad as depth at centre; mental broad, subtriangular, usually bordered below by two medium-sized postmental scales. The species is diurnal.

*Description.* Head oviform, moderately large; snout wedge-shaped, canthus rostralis relatively well defined; forehead flat; ear-opening small to minute, oval, horizontal; body and limbs moderate to robust; digits free, clawed, somewhat dilated, narrowing distally, 11-17 (usually 13-14) straight-edged lamellae under 4th toe; dorsal surface of snout (Fig. 6), to level of eyes, covered with very large, flat, close-packed scales, more posteriorly, head scales small and granular; rostral (Fig. 3) (of adult) usually more than two and a half times as broad as depth at centre, with median cleft extending downwards from upper border; nostril pierced between first upper labial and 3-5 (usually 4) nasals, the anterior-most of which is enlarged; 1 large internasal; 9-14 (usually 12) upper labials, and 9-13 (usually 11) lower labials; mental (Fig. 4) broad, subtriangular, usually bordered below by two medium-sized postmental scales; dorsal body scales small, granular, abdominal scales small, subimbricate; males with large oval patch of preanal pores, and 2-3 rows of femoral pores, females with vestigial preanal pores and with or without a few scattered vestigial femoral pores; tail elongate, stout, prehensile, tapering finely, covered with moderate-sized scales; in males the base of the tail swollen to accommodate the hemipenes, and with 2-3 large, pointed conical scales on each side of the swollen base; females with small vestiges of these scales.

*Colour.* Dorsal surface vivid green, frequently with tan, yellow, pale green or grey markings, which may be outlined with a fine black or brown line, and extend on to the tail; in some individuals markings may be in the form of mosaics of different coloured scales. Ventral surface pale, bright green, sometimes with a yellowish tinge; males with a blue stripe on the flank separating dorsal and ventral coloration. Lower lip sometimes with a white band; mouth deep blue, tongue bright orange or red. Undersurface of feet and toes yellow; dorsal surface of toes fringed with yellow. Greenish yellow individuals occur very infrequently; these may be marked with white.

*RANGE.* Confined to the northern extremity of the North Island (Fig. 7).

*TYPE LOCALITY.* Bay of Islands.

*Holotype.* Adult female in the collection of the British Museum (Natural History). (BMNH 1946.9.8.16).

*Material examined.* *Naultinus grayi*. Holotype: B.M.(N.H.) 1946.9.8.16. Ecology Division, D.S.I.R. collection: G231, 232, 303, 308, 770, 789, 797, 897. Auckland Institute and Museum collection: Rep. 27-24, 27-25. Zoology Department, University of Auckland, collection: R105-7. Live specimens: 7 in private collection (R.A.H.), Kaitia area (3), Lake Ohia district (4); 83 in field, Lake Ohia district.

## DISCUSSION

Three distinct forms of *Naultinus* can be distinguished morphologically — one found in the extreme north of the North Island, one in the central area of the North Island, and some off-shore islands, and one in the southern and south eastern regions of the island. These forms are designated in this paper *N. grayi*, *N. elegans elegans*, and *N. elegans punctatus* (stat. nov.) respectively. They have allopatric distributions with very little overlap or intergradation between them (Fig. 7). The only obviously hybrid population known to the authors is one near Turangi, in which most animals are typical *N. e. elegans*, but some are much larger and more heavily built, probably indicating *N. e. punctatus* ancestry.

Morphologically the three forms may be distinguished mainly by colour, scalation, and size differences. *N. grayi* has an orange to red tongue contrasting with dark blue mouth lining, whereas in both subspecies of *N. elegans* the tongue and mouth are uniformly blue. *N. e. elegans* (snout-vent length 65-75 mm) is considerably smaller than *N. e. punctatus* and *N. grayi* (snout-vent length 95 mm). *N. e. punctatus* is relatively heavier and more stocky in build, than specimens of the other two forms.

The most common colour in all three forms is plain green in various shades. In *N. e. punctatus* the only common variation of this is a double line of pale grey-green spots or streaks down the back, but in both *N. e. elegans* and *N. grayi* the markings may be much more pronounced and varied in form and colour. Despite the superficial similarities in the variety of markings in these two forms, however, numerous small but consistent differences suggest that they represent parallel elaborations from a simpler ancestor. In both forms the markings may be simple (as in *N. e. punctatus*) or outlined in dark green or black. A double row of spots on the dorsal surface is the most common form of marking, and in more heavily marked specimens there is usually longitudinal striping on the under-surface, and there may be an extra row of smaller spots along each flank, and markings on the limbs.

Bright yellow, white, or light green markings are found in both of these forms, while pale gold and pink markings are found only in *N. e. elegans*, and pale grey or tan markings are unique to *N. grayi*. This latter form is also the only one in which markings made up of mosaics of differently coloured scales occur. In *N. elegans* individual markings are, in our experience, always of a single colour, (except when provided with a brown or black outline).

Rostral and mental scales show differences, as indicated in Table 1 and Figs. 1-4. All *Naultinus* adults show sexual dimorphism in colour; males have a blue lateral or ventral component which is absent in females. In *N. grayi* males are born with a pale blue belly and dark green dorsal surface, while newborn females may show some blue mottling on the belly. In the female the blue quickly disappears so that by the time the animal is six months old the adult colouration (bright green dorsally, pale green ventrally) is established. In the male of this species the blue colouring migrates laterally to form a band along each flank, separating the dark green dorsal surface from the vivid pale green belly characteristic of the adult. Adult male *N. e. punctatus* show the same colour pattern. In *N. e. elegans* however, no change of distribution of the blue pigment occurs except for a slight spreading and intensification as the animal matures, so that the whole ventral surface and the lower part of the lateral surface is light blue in the adult male, and in some specimens the dorsal surface also appears to have been "washed" with blue.



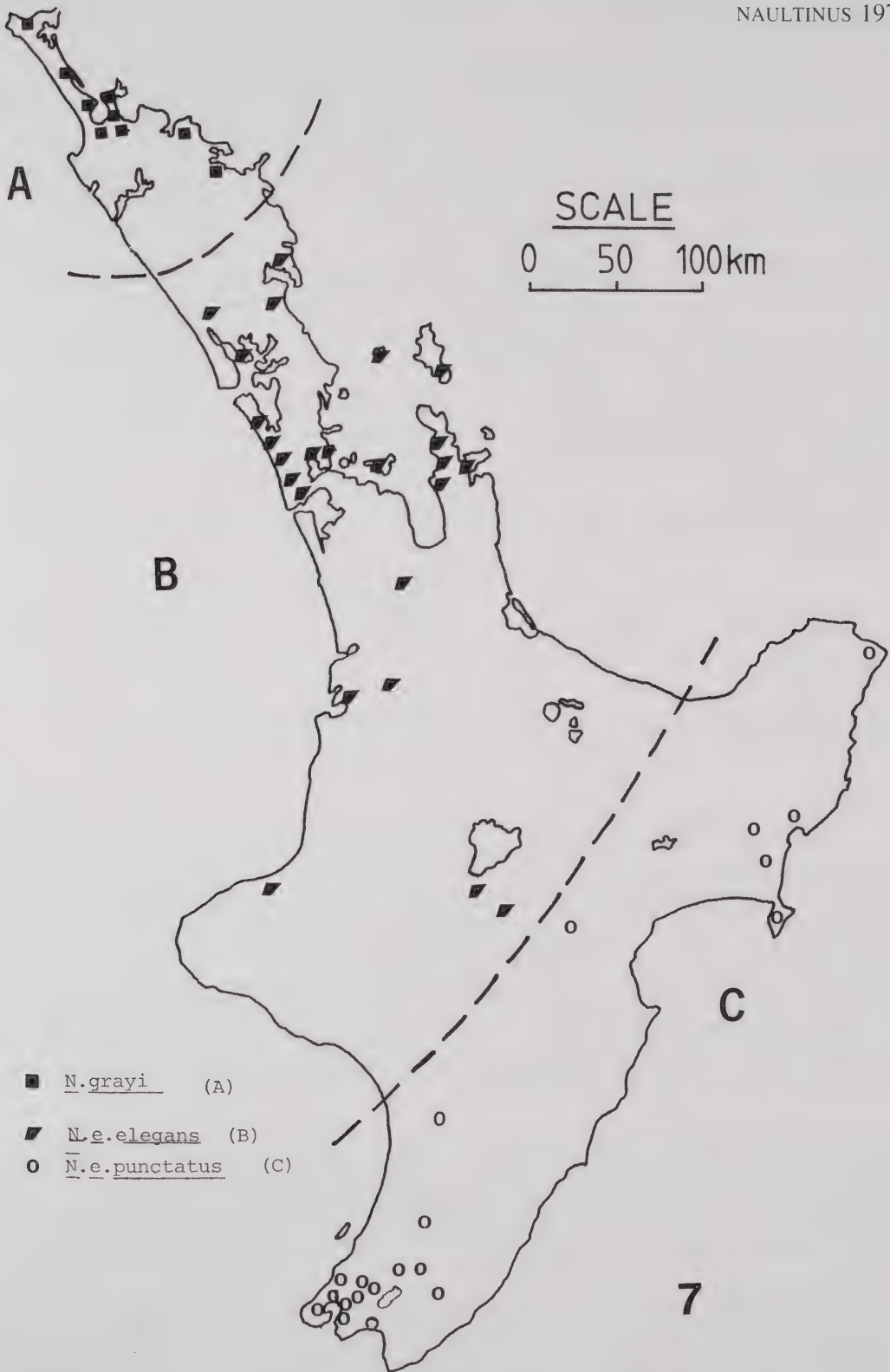


Fig. 7. Localities of *Nautinus* specimens examined.

Table 1. Summary of characters distinguishing taxa within the genus *Naultinus*.

	<i>N. elegans</i>		<i>N. grayi</i>
Scales on snout	Domed, round-based		Flat, polygonal
Rostral	Width less than two and a half times height at centre		Width two and a half or more times height at centre
Mental	Usually roughly oblong or square, bordered posteriorly by 3-4 small submentals.		Usually roughly subtriangular or oblong, bordered posteriorly by two submental scales
Snout	Bluntly rounded		Wedge-shaped
Earhole	Moderate		Small
Vestigial preanal pores in female	Absent, or very few		Usually present
Young born	Late winter — early spring		Late summer
	<i>N.e. elegans</i>	<i>N.e. punctatus</i>	
Markings	Complex	Simple	Complex
Undersurface of feet and toes	Grey-green	Yellow	Yellow
Belly of adult male	Blue	Green	Green
Enlarged scales at base of tail in male	Green	Yellow	Green

Apart from the differences in structure, colour, and size between the three forms described above, *N. grayi* is separated by its reproductive cycle from the subspecies of *N. elegans*. The young of the former are born during late summer (March) in the field after a gestation period of 7-8 months, mating occurring in early spring (late July-August). Most animals mature during their second spring at 16-17 months of age, and have their first young at two years of age. By contrast *N. elegans* produces its young in the field in early spring (August) and mating occurs within a month to give a gestation period of about 11 months. A combination of slower juvenile growth and the much longer gestation period means that in this form the first young are not born until the animal is at least three years old.

We are of the opinion that these consistent physical differences justify a formal description of three separate taxa, and the demographic differences between the northern taxon and the other two warrant a specific distinction between them. Accordingly, two species, *N. grayi* and *N. elegans* are recognised by this study, and *N. elegans* is split into two subspecies *N. elegans elegans* and *N. elegans punctatus*.

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